

# Technology Opportunity

## Design and Analysis of Composite Materials and Structures

The National Aeronautics and Space Administration (NASA) seeks to transfer software tools to design and analyze composite materials and structures.

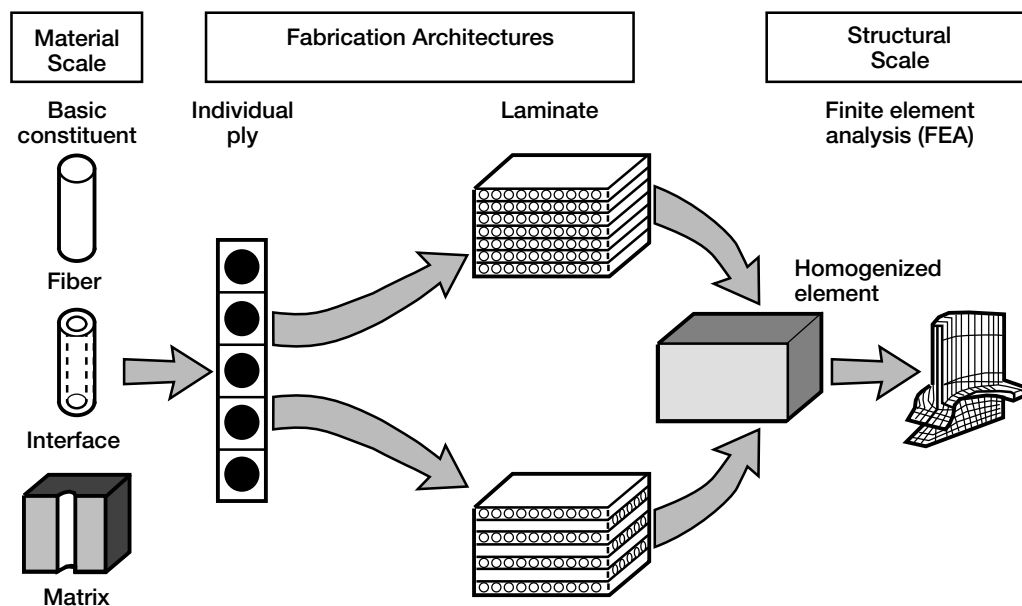
### Potential Commercial Uses

- Aerospace components
- Automotive components
- Biomedical devices
- Civil structures
- Construction materials
- Heat exchangers
- Pressure vessels and piping
- Sporting goods
- Off-shore drilling structures

- Transportation components
- Electronic components
- Utility structures

### Benefits

Today's emphasis on shorter product development times and lower costs have made it necessary to use high-fidelity simulation software tools earlier in the design process. Such software enables companies to develop new materials and products more quickly and cost effectively. Introducing computer simulation earlier in the design process reduces costly trial-and-error experiments and effectively allows the engineer to explore more product design options. Simulation software also enables engineers to better define the tests necessary to verify component



Simulation Software for Design and Analysis of Composite Materials and Structures



performance. In today's competitive environment, customers expect sophisticated analysis and prediction of how their products will perform.

## The Technology

Simulation software tools developed at NASA Lewis Research Center make it possible to quickly and accurately predict the structural performance of advanced and composite materials. These tools offer superior structural performance modeling based on realistic considerations of physical parameters such as fabrication architectures and processing variables; material response to thermomechanical cyclic loading; deformation, damage, and failure mechanisms; and temperature and environmental degradation effects. The tools have already been successfully applied to many challenging engineering problems ranging from jet engine turbomachinery to artificial hip joints and concrete building materials.

Advanced composite materials can provide stiffer, stronger, and lighter weight products, especially for use in hostile environments. Determining the proper combination and architecture of composite materials is a complex problem that requires sophisticated design and analysis tools.

## Options for Commercialization

These software tools were developed by NASA Lewis through in-house research and through contracts and grants. They are available from NASA's Computer Software Management and Information

Center (COSMIC, University of Georgia, 382 E. Broad Street, Athens, GA 30602-4272) for a fee. For companies interested in hands-on assistance in applying these tools to their engineering problems, NASA and Battelle Memorial Institute have formed a consortium for the Design and Analysis of Composite Materials. This consortium will allow companies to evaluate the applicability of simulation software to specific design processes and give them the opportunity to customize the software tools to their own proprietary design environments.

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## Key Words

Composite materials  
Structures  
Design  
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Simulation software



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Space Administration  
Lewis Research Center